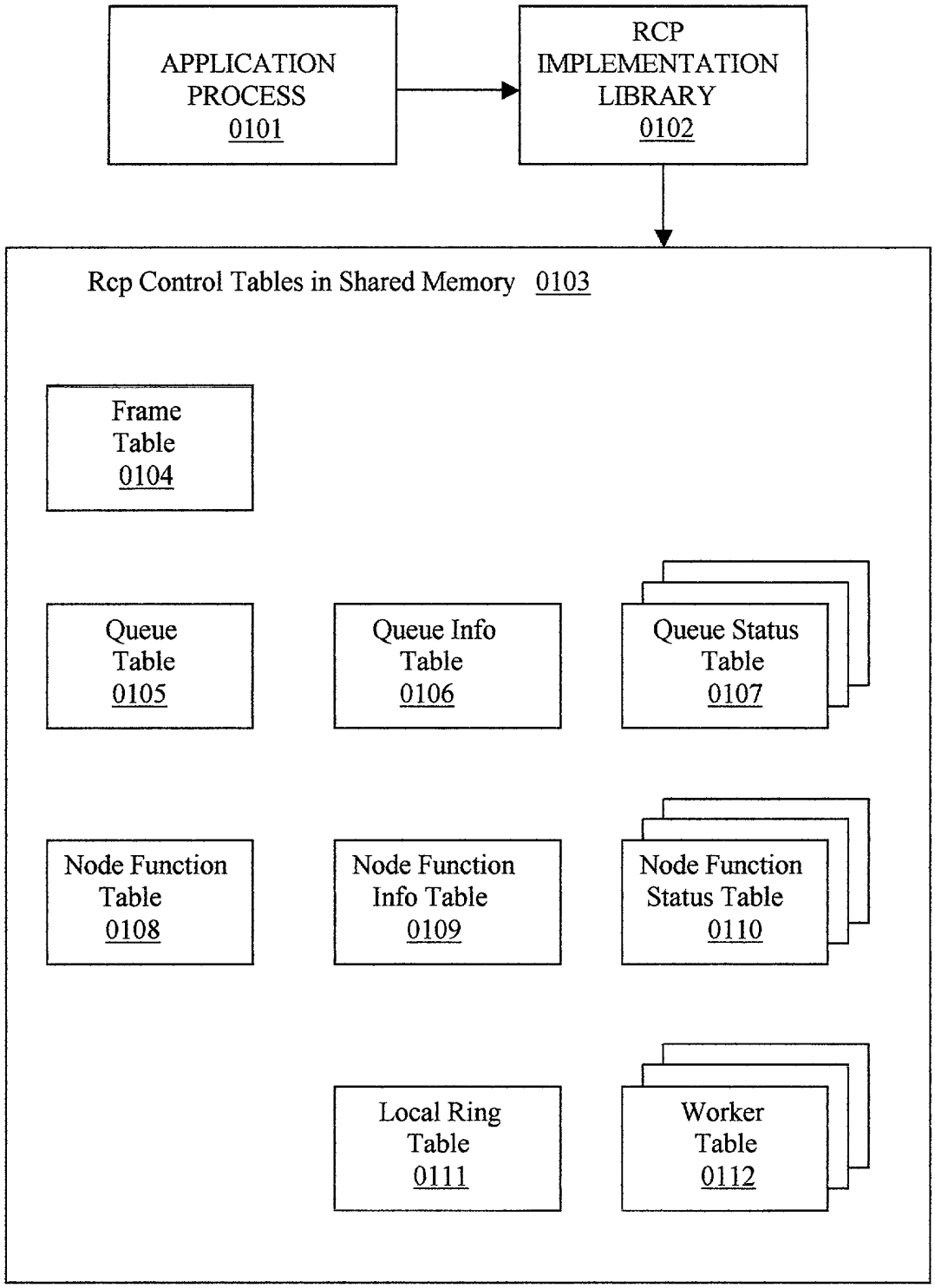

Figure - 1 : Schematic of a Rcp Application

Q	Queue Name	Q

Figure - 2 : Schematic of a Queue

QA	Queue Array Name	QA

Figure - 3 : Schematic of a Queue Array

VQ	Virtual Queue Name	VQ

Figure - 4 : Schematic of a Virtual Queue

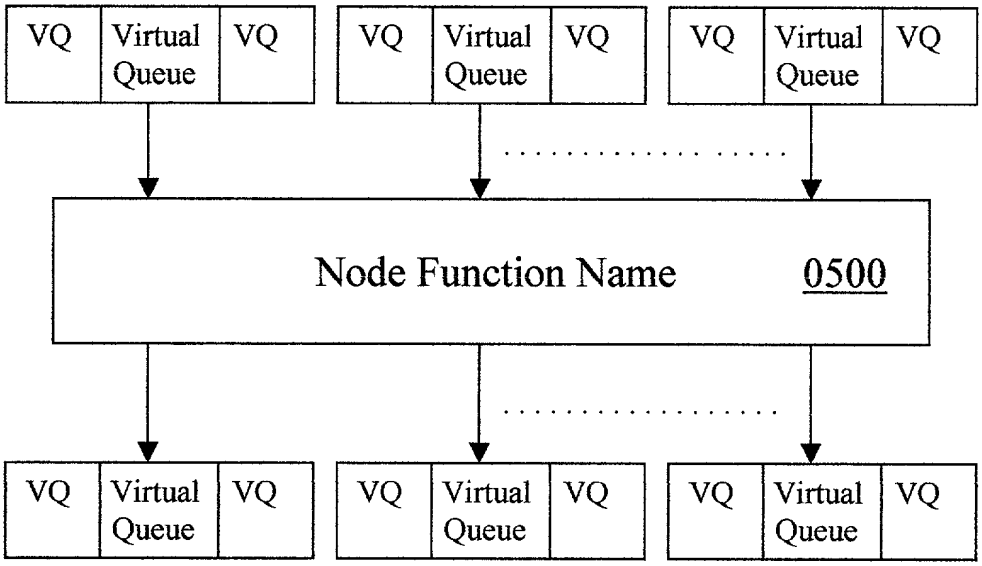

Figure - 5 : Schematic of a Node Function

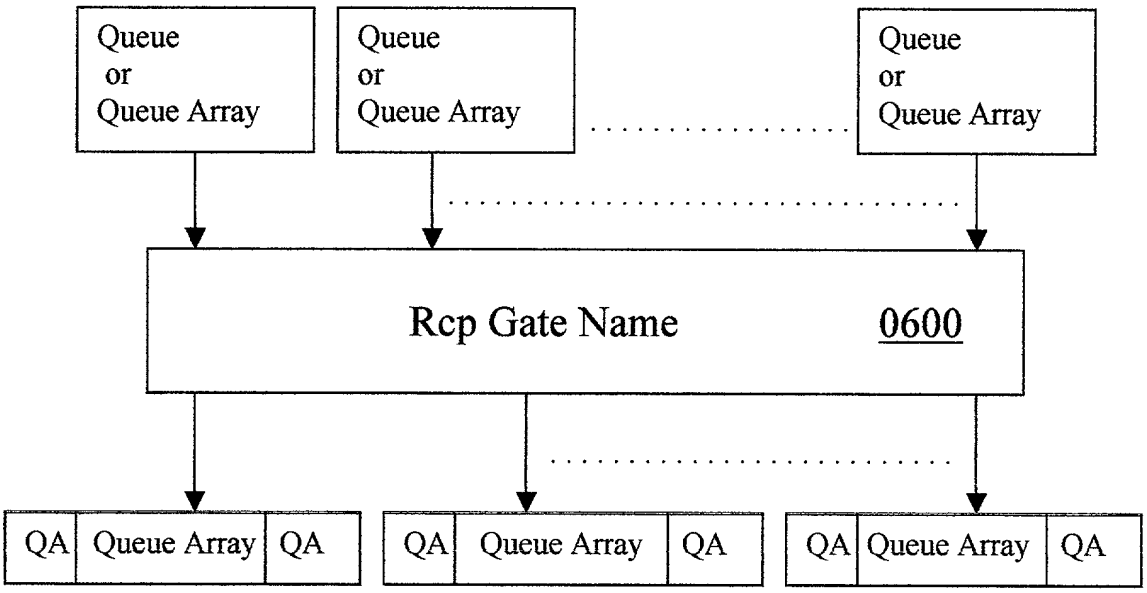

Figure - 6 : Schematic of a Rcp Gate

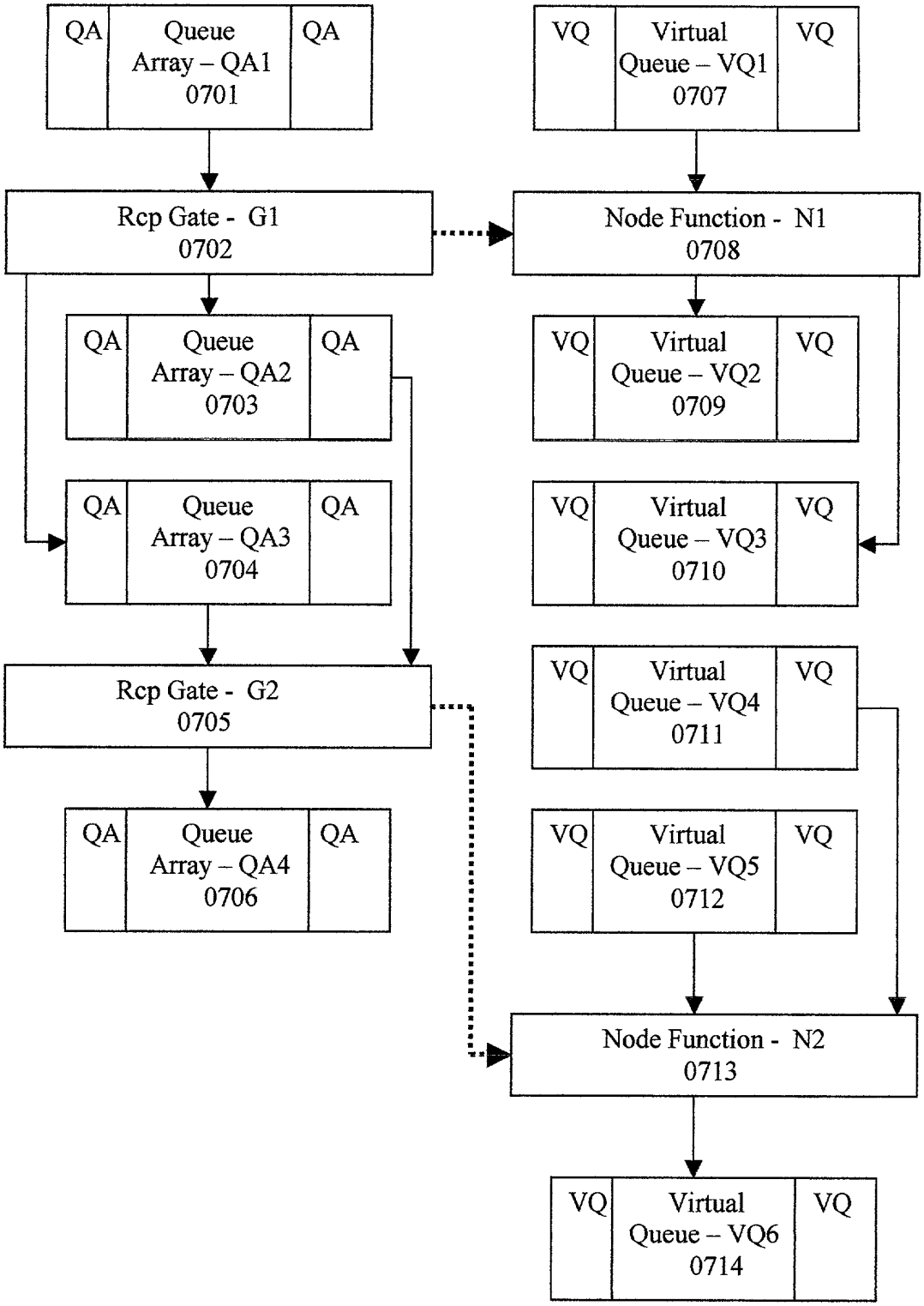

Figure - 07 : Rcp Gate Interconnections

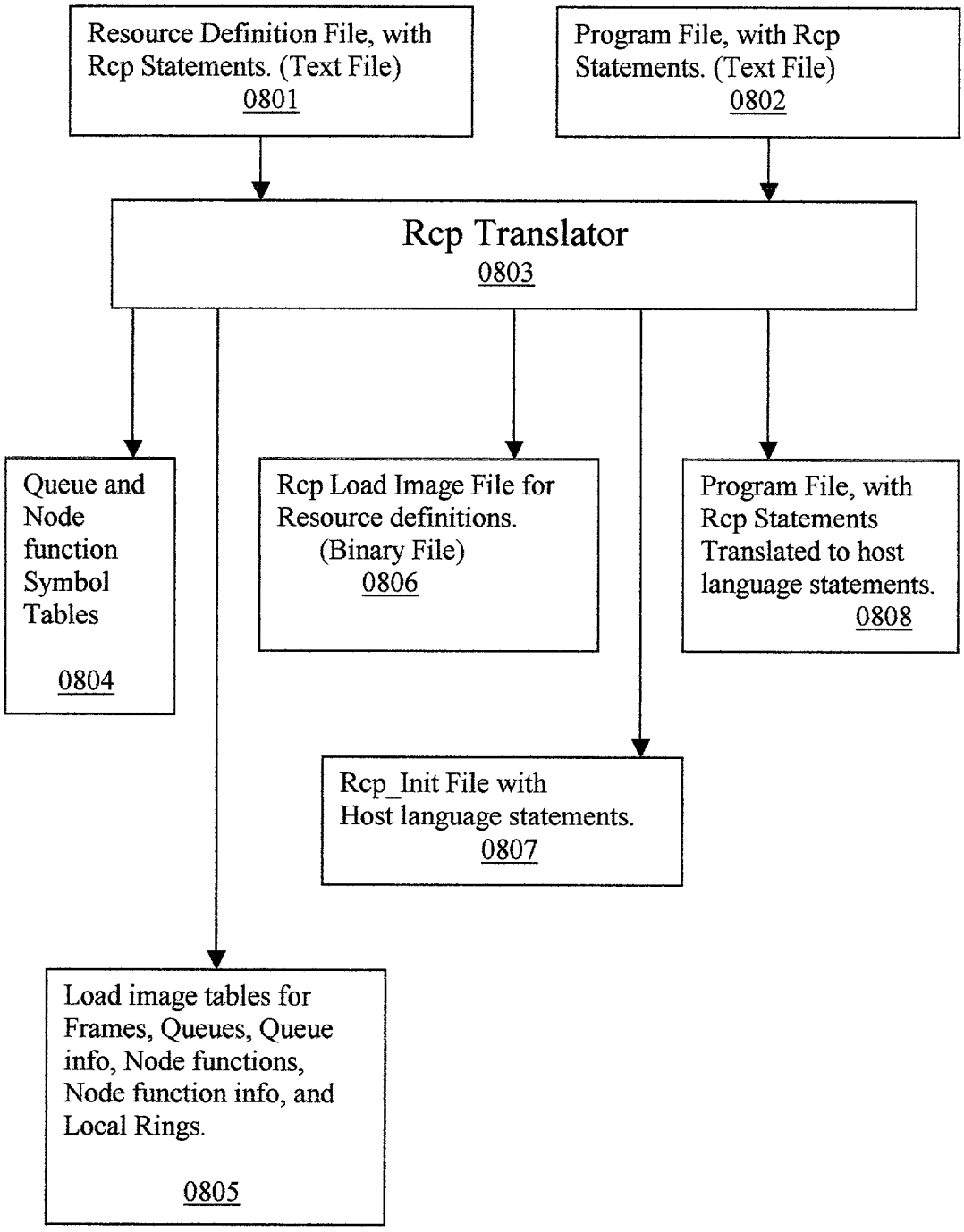

Figure - 8 : Schematic of Rcp Translator

Load Image Header Record	(Fixed Length)	(0901)
Frame Table Record	(Variable Length)	(0902)
Queue Table Record	(Variable Length)	(0903)
Queue Info Table Record	(Variable Length)	(0904)
Node Function Table Record	(Variable Length)	(0905)
Node Function Info Table Record	(Variable Length)	(0906)
Local Ring Table Record	(Variable Length)	(0907)

Figure - 9 : Schematic of a Load Image File Layout

Frame Table Size	1001
Queue Table Size	1002
Queue Info Table Size	1003
Node Function Table Size	1004
Node Function Info Table Size	1005
Local Ring Table Size	1006

Figure - 10 : Schematic of Table Image Header Structure

Frame Status	1101
Min Workers	1102
Max Workers	1103
Frame Lock	1104
Frame Status Lock	1105
Self Assignment flag	1106
Reference to Queue Table	1107
Reference to Queue Status Table	1108
Reference to Queue Info Table	1109
Reference to Node Function Table	1110
Reference to Node Function Status Table	1111
Reference to Node Function Info Table	1112
Reference to Local Ring Table	1113
Reference to Worker Table	1114

Figure - 11 : Schematic of a Frame Structure

Thread Info	1201
Worker Status	1202
Node Function Id Invocation Num	1203 1204
Worker flag	1205

Figure - 12 : Schematic of a Worker Structure

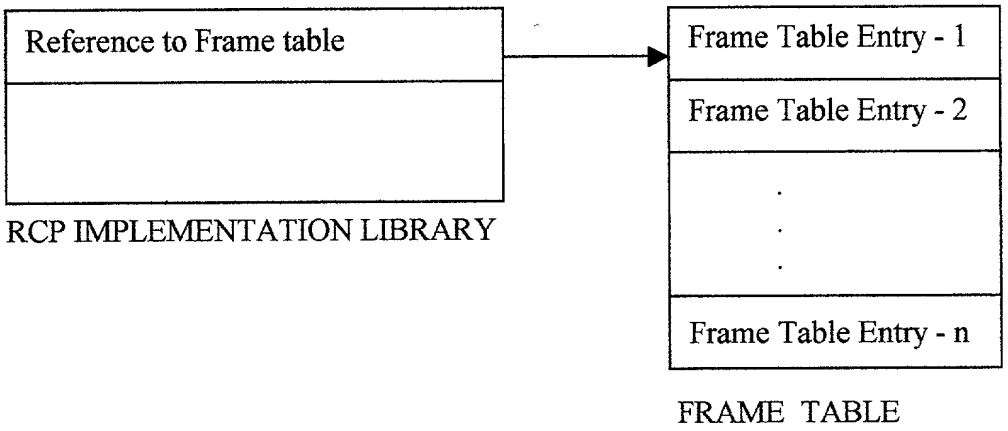

Figure 13 : Schematic of the relation between the Rcp Implemenation library and the Frame Table.

Frame Number	<u>1401</u>
Worker Id	<u>1402</u>

Figure 14 – Schematic of Run id

Queue Type	1501
Queue Info Offset	1502
Bind to Queue Num	1503
Disposition Queue Num	1504
Input-Output Flag	1505

Figure - 15 : Schematic of a Queue Structure

Queue Num	1601
Num of Consumer Functions	1602
Num of Producer Functions	1603
Fctn Num	1604
- - - Fctn Nums - - -	1604
Fctn Num	1604
-1 (Sentinel)	1605

Figure - 16 : Schematic of a Queue Info Structure

Rcp Gate Num	1606
Num of Node Functions	1607
Fctn Num	1608
- - - Fctn Nums - - -	1608
Fctn Num	1608
-1 (Sentinel)	1609

Figure – 16A : Schematic of a Rcp Gate info Structure

Function type	<u>1701</u>
Function Info offset	<u>1702</u>
Rcp Gate info offset	<u>1703</u>
Node Function Pointer (Method Reference)	<u>1704</u>
Rcp Gate Num	<u>1705</u>
Max Function Invocations -- or -- Local ring number	<u>1706</u> <u>1707</u>

Figure - 17 : Schematic of a Node function Structure

Node Function Num
Num of input Queues
Num of output Queues
Queue Num - 0
--- Queue Nums ---
Queue Num – n
-1 (Sentinel)

Figure – 18 : Schematic of a Node Function info structure

Bind Info bits Lock for Bind Info Bits	1901 1902
Next Output Bind Sequence Num	1903
Num of Rcp Gates	1904

Figure - 19 : Schematic of a Local Ring Structure

Queue Status	2001
Reference to Queue Data Node	2002
Reference to Queue Array Node - or - Reference to Virtual Queue Node	2003 2004
Queue Lock	2005

Figure 20 - Schematic of a Queue Status Structure

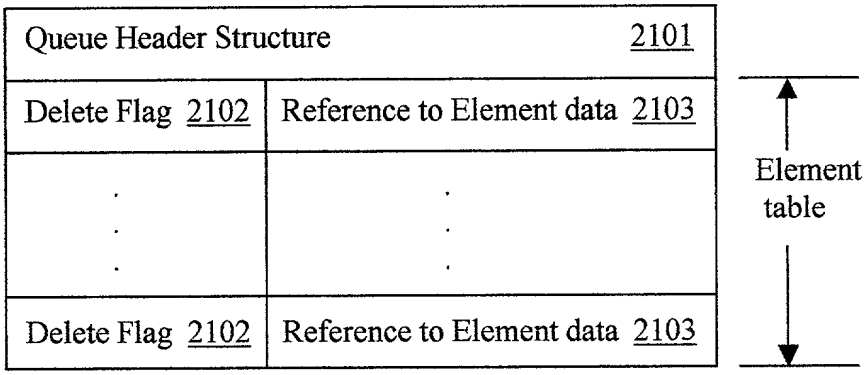

Figure - 21 : Schematic of a Queue Data Node Structure

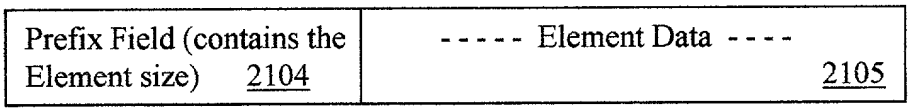

Figure - 21A : Schematic of Element data

Consumer Lock Count	2201
Producer Lock Count	2202
Element Size	2203
Num of Elements	2204
Last Element	2205
Reference to Lock Table	2206

Figure - 22 : Schematic of a Queue Header Structure

Node Function Num	2301
Lock	2302

Figure - 23 : Schematic of a Lock Structure

Num of Queues in Queue Array	2401
Reference to queue table	2402
Reference to queue status table	2403
Ready Queue bits	2404
Not Ready Queue bits	2405
Null Queue bits	2406
Lock for Queue bits	2407
Reference to Bind Sequence Num Table	2408

Figure - 24 : Schematic of a Queue Array Node Structure

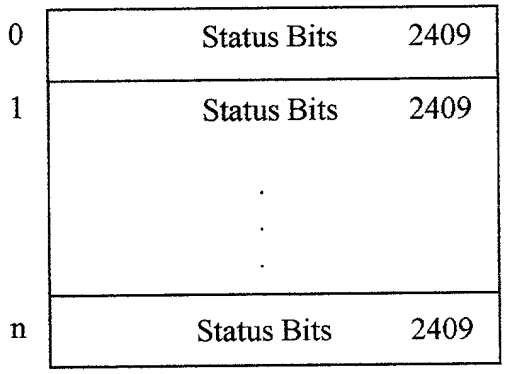

Fig – 24A : Schematic of Status Bits Structure

Gate number	2501
Bind Seq number	2502

Fig – 25 : Schematic of a Bind seq number structure

Figure - 26 : Schematic of a Virtual Queue Node

Status of the Node Function	2701
Rcp Gate Function release bits	2702
Reference to Node Function Invocation table -- or -- Reference to Rcp Gate Node	2703 2704

Figure - 27 : Schematic of a Node function status structure

Rcp Gate Status	2801
First Input Queue Array num	2802
First Output Queue Array num	2803
Node Function Invocations Running	2804
Node Function Invocations Selected	2805
Num of Worker assignments	2806
Input queues available	2807
Output queues available	2808
Pending Inputs	2809
Reference to Bind table	2810
Bind Table Input Index	2811
Bind Table Output Index	2812
Rebind Index	2813
Next Input Bind Sequence Num	2814
Next Output Bind Sequence Num	2815
Bind Lock	2816
Rebind Lock	2817
Release Lock	2818
Producers Terminated	2819

Figure - 28 : Schematic of a Rcp Gate Node Structure

Bind Flag	2901
Null Flag	2902
Input Queue index	2903
Output Queue index	2904
Input bind seq num	2905
Output bind seq num	2906

Figure - 29 : Schematic of a Rebind node structure

Status of Invocation	3001
Bind Status	3002
Rebind Index	3003
Input Queue Index	3004
Output Queue Index	3005
Bind Sequence Num	3006

Figure - 30 : Schematic of a Node function Invocation Structure

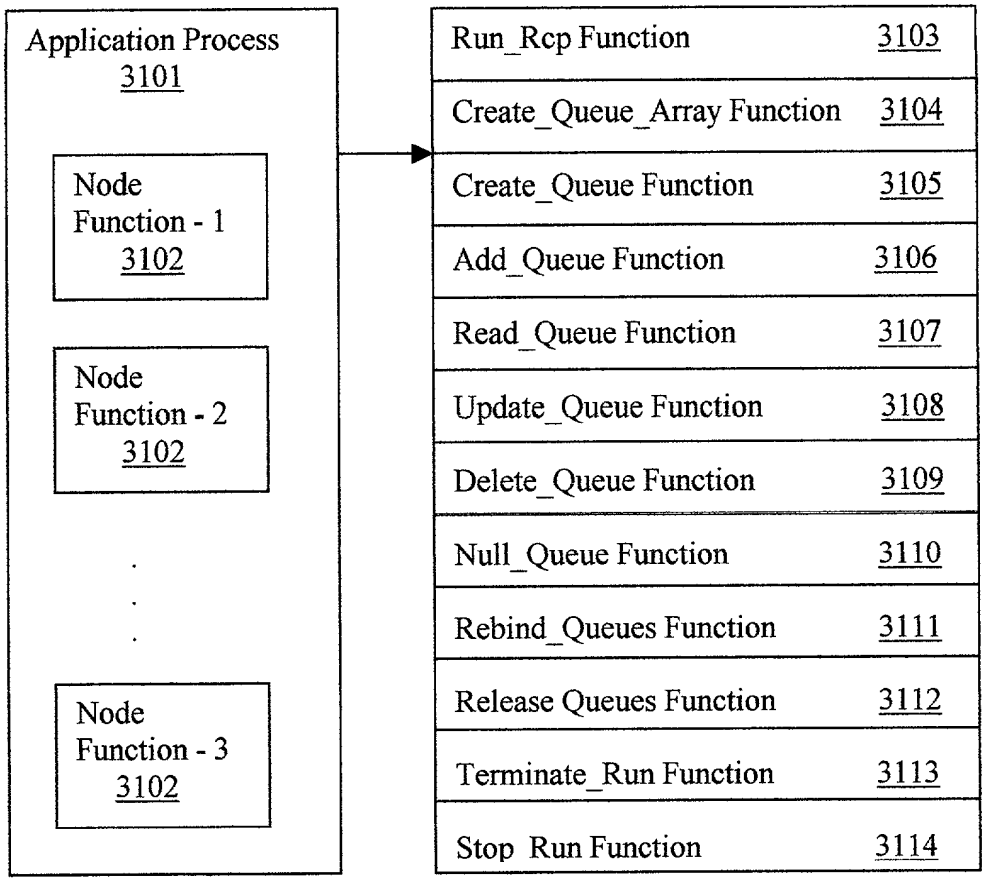

Fig - 31 : Rcp functions corresponding to Rcp Statements

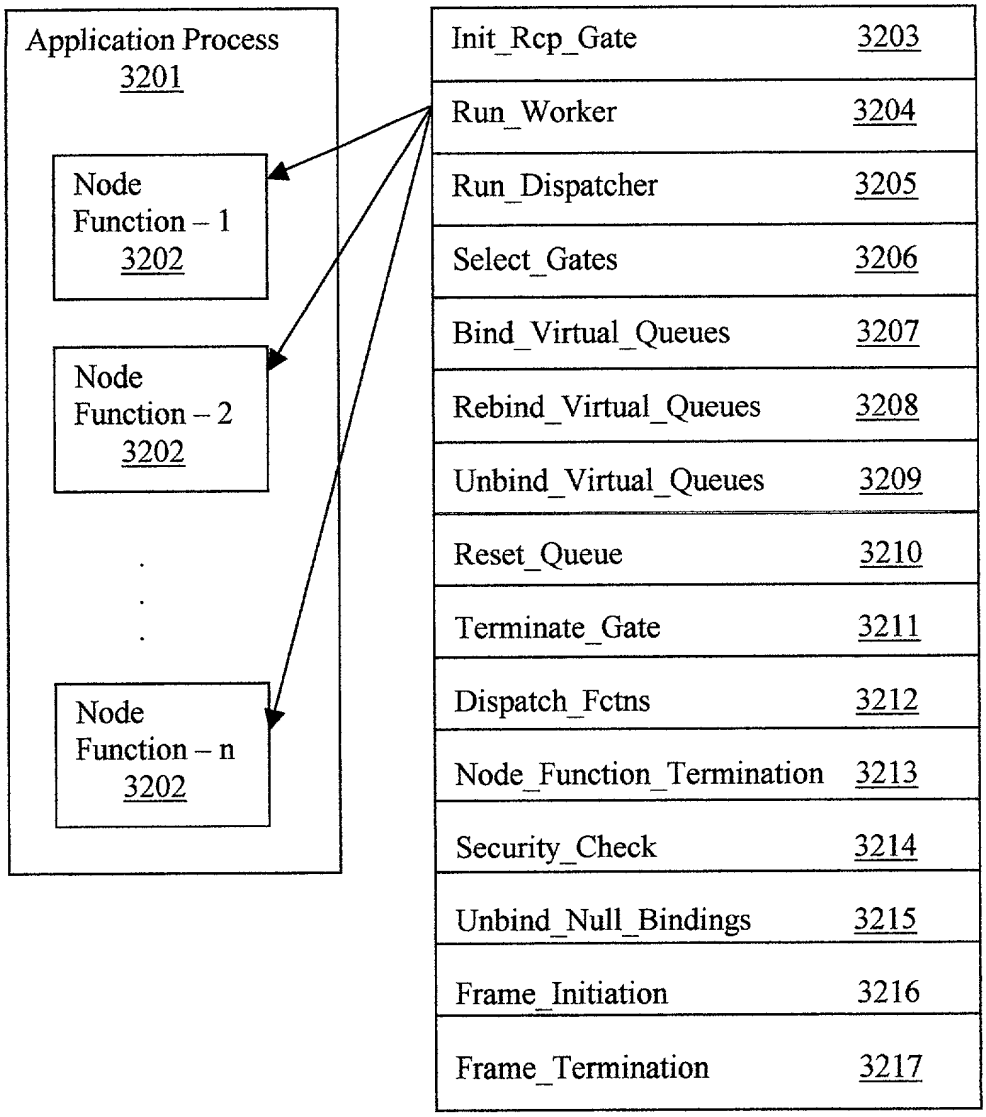

Fig - 32 : Rcp Implementation library Internal functions

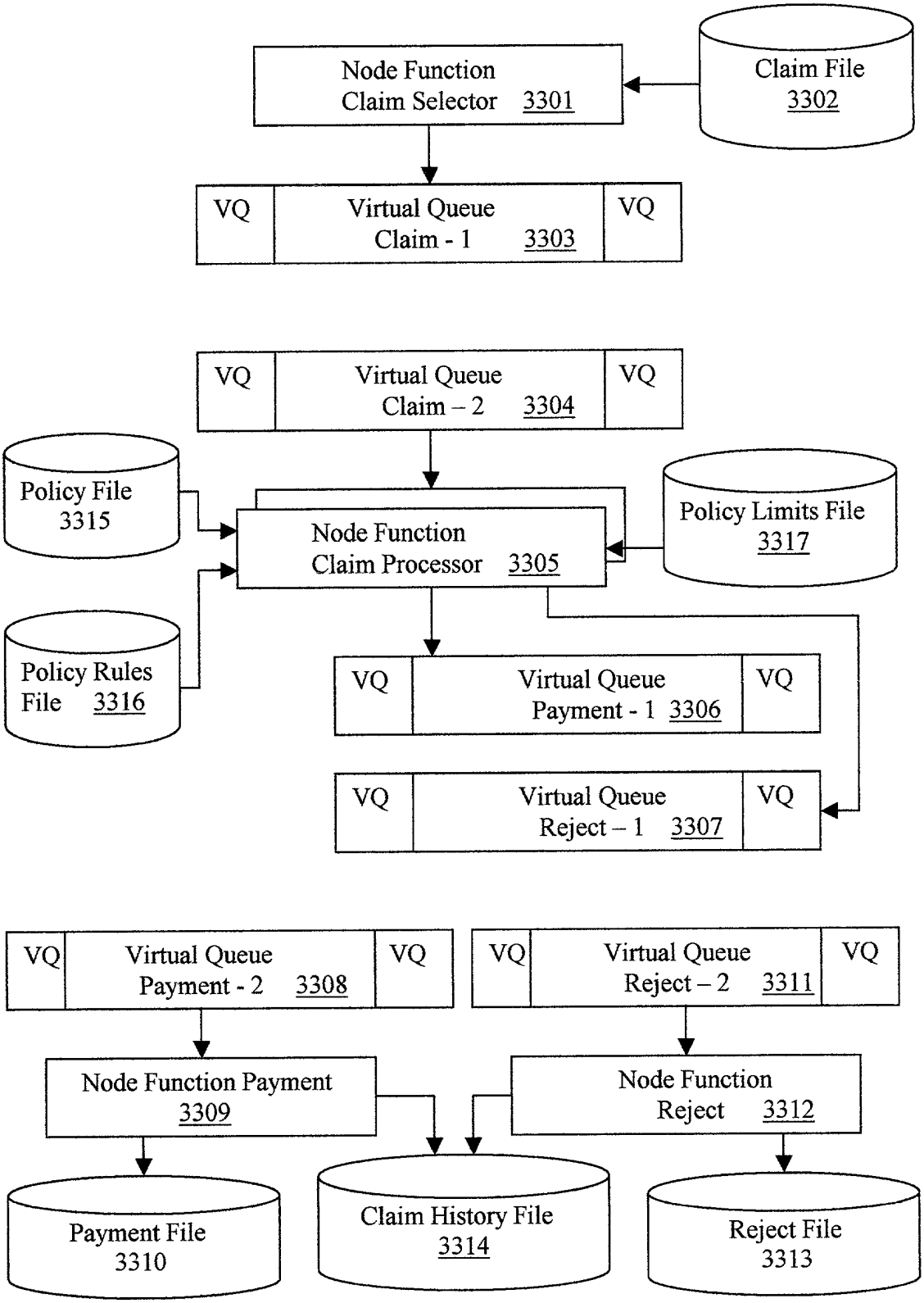

Figure - 33 : Schematic of a sample application (Node Function configuration)

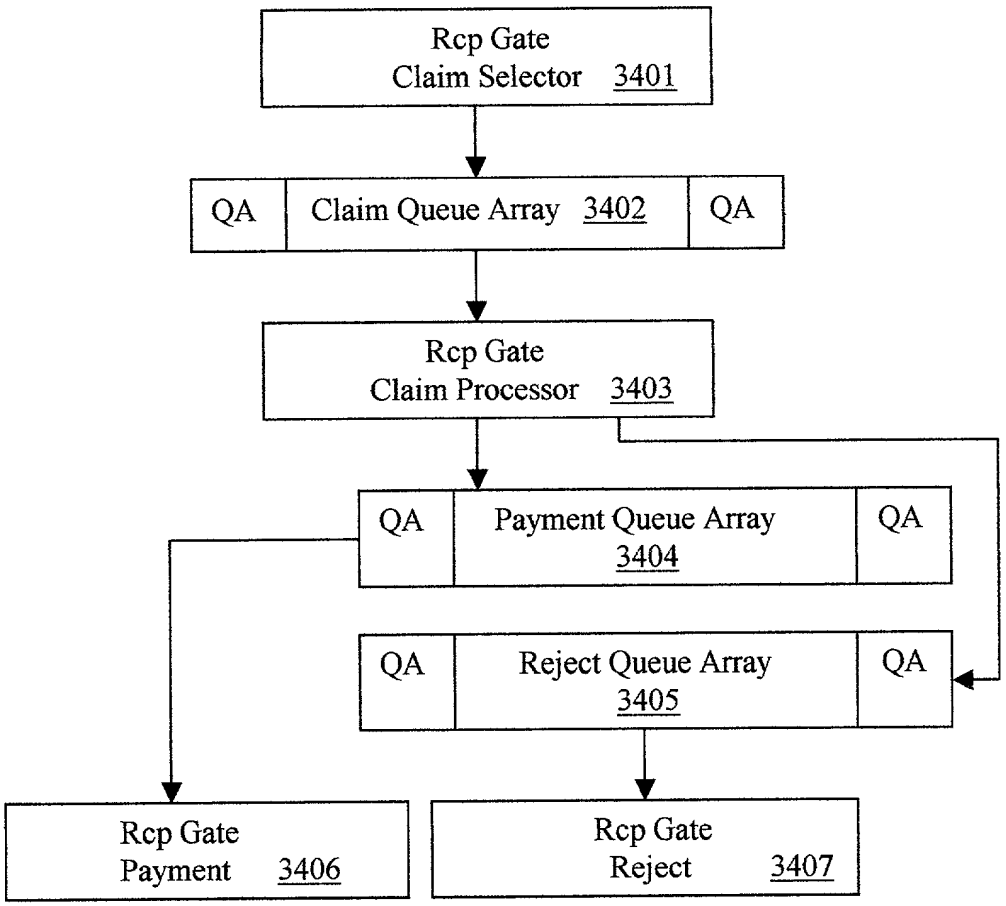

Figure - 34 : Schematic of a sample application (Rcp gate Configuration)

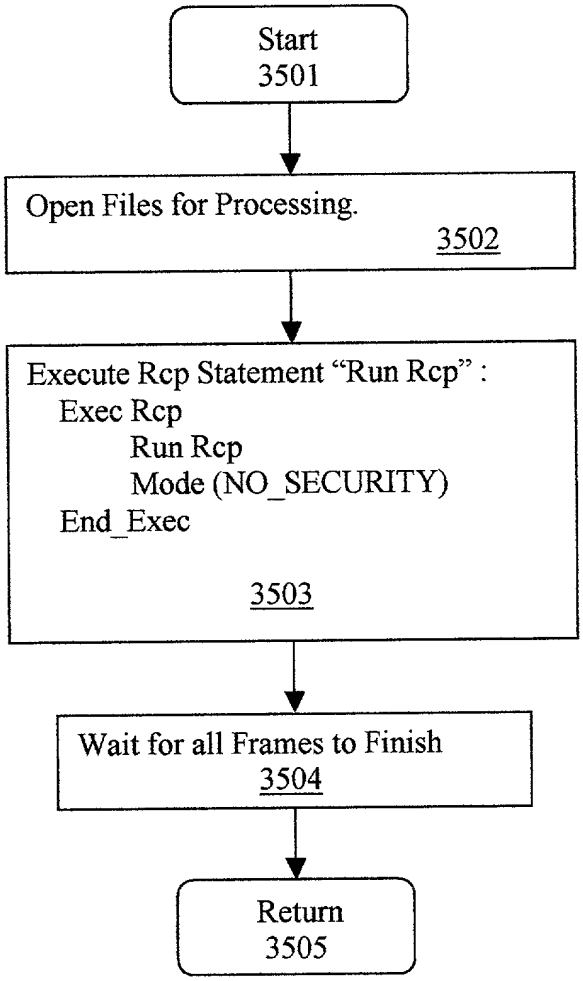

Figure - 35 : Flow chart of the Main function in the sample Application

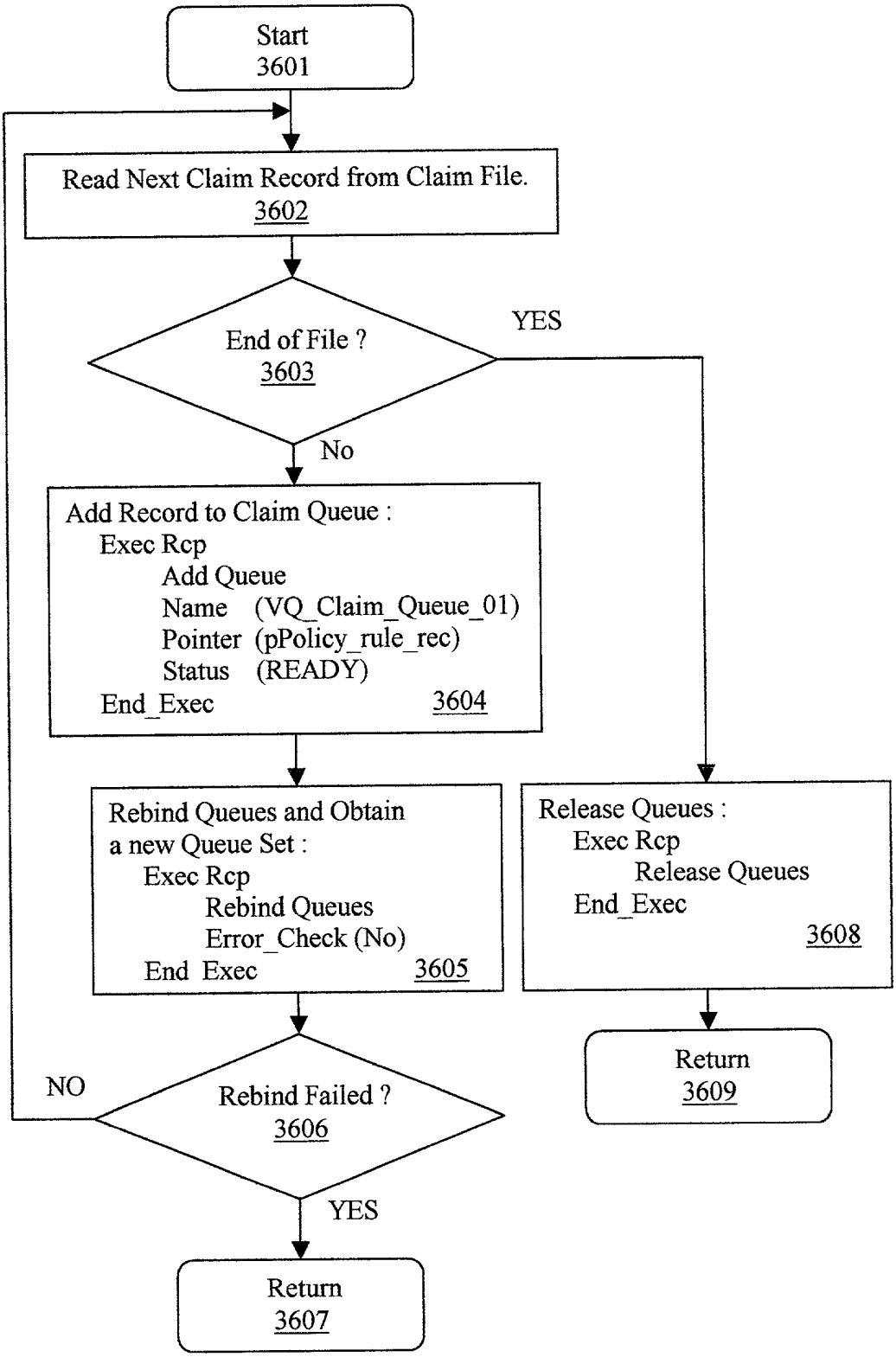

Figure - 36 : Flow chart of the Claim Selector function in the sample Application

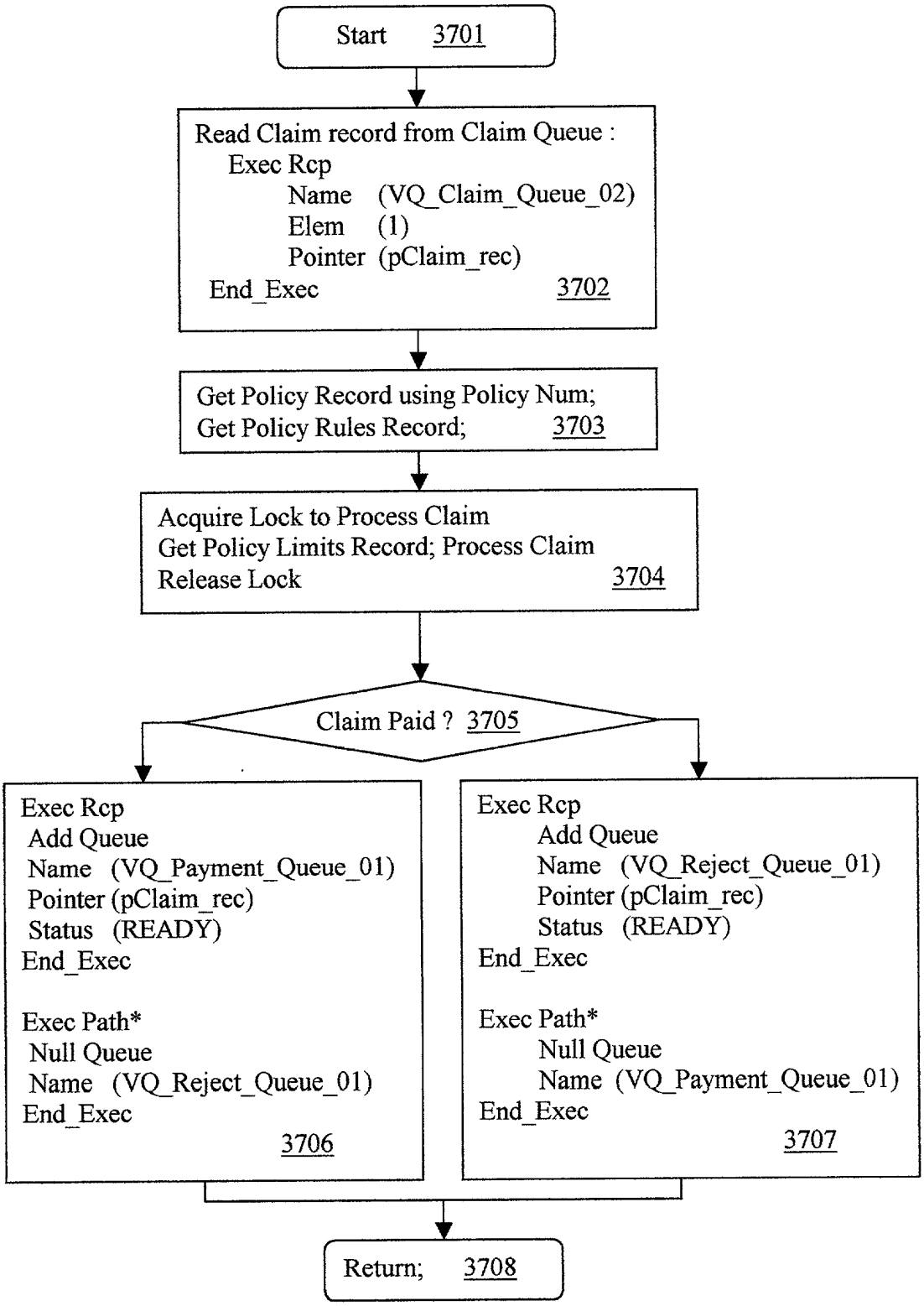

Figure - 37 : Flow chart of the Claim Processor function in the sample Application

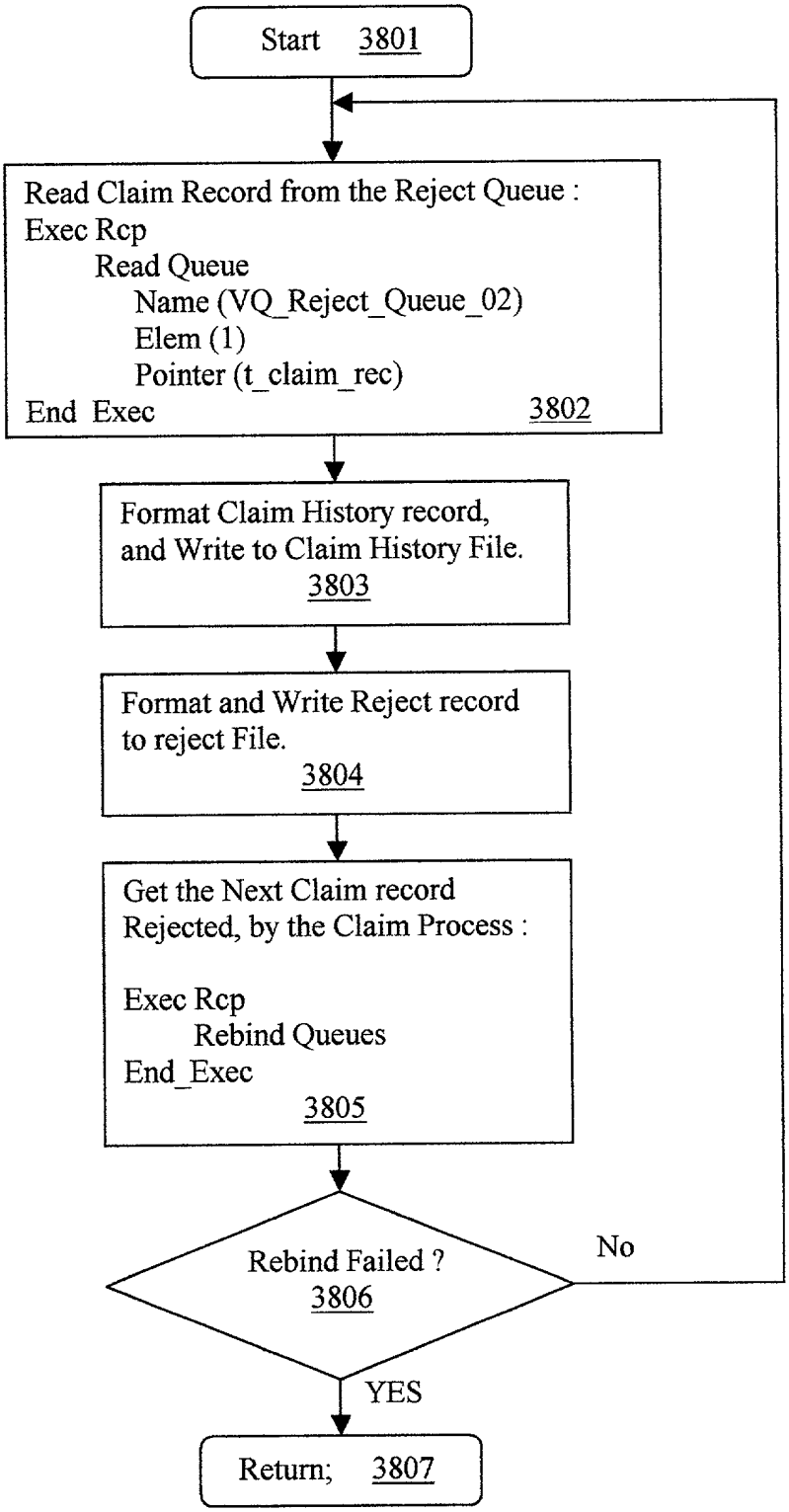

Figure - 38 : Flow chart of the Reject function in the sample Application

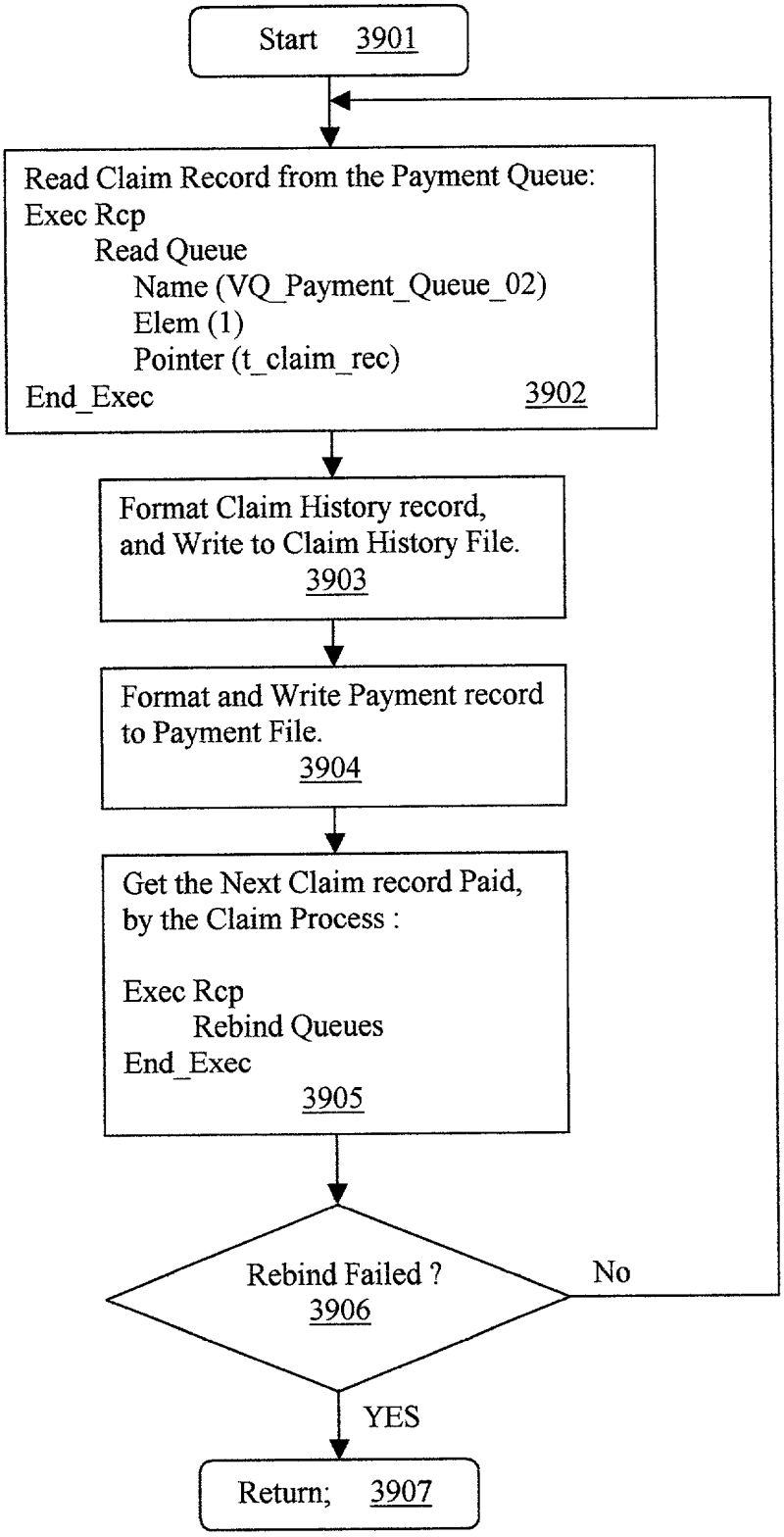

Figure - 39 : Flow chart of the Payment function in the sample Application

	REMARKS	RCP GATE NUMBER	MAX INVOCATIONS - OR - LOCAL RING
0	Rcp Gate Claim Selector	NULL	0
1	Rcp Gate Claim Processor	NULL	1
2	Rcp Gate Payment	NULL	2
3	Rcp Gate Reject	NULL	3
4	Node function Claim Selector	0	1
5	Node function Claim Processor	1	2
6	Node function Payment	2	1
7	Node function Reject	3	1

Figure 40 – A partial view of the node function table for the Sample application.

```
==========RCP
IMPLEMENTATION LIBRARY TRACE :
RUN_RCP FUNCTION : STARTED : The time is Fri Feb 09 19:03:31.312 2001
==========

----------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 33/33
Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
----------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0
----------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0
----------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0
----------
WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1
----------
```

Figure – 41 : Trace of the sample application

```
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 33/33
Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0
---------------------------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 0 Self_Assignment = 1
---------------------------------------------------------------------------------------------------
```

Figure – 42 : Trace of the sample application

```
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 203
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 65/65
Worker Assignments = 1

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 33/33
Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 33/33
Worker Assignments = 0
---------------------------------------------------------------------------------------------------WORKER
ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1
---------------------------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 2, fctn = 6, Invoke_id = 0 Self_Assignment = 0
---------------------------------------------------------------------------------------------------
```

Figure – 43 : Trace of the sample application

```
--------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
--------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 115
Input/Output Queues Available = 32/4
Input/Output Bind seq nums = 65/37
Worker Assignments = 1

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
--------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 1
Rcp Gate Efficiency = 103
Input/Output Queues Available = 26/26
Input/Output Bind seq nums = 33/33
Worker Assignments = 1
--------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
--------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 0 Self_Assignment = 1
--------------------------------------------------------------------------------
```

Figure – 44 : Trace of the sample application

```
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 1

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 1

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 92
Input/Output Queues Available = 32/22
Input/Output Bind seq nums = 158/148
Worker Assignments = 5

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 1

Fctn invocations selected = 0
Fctn invocations running = 1
Rcp Gate Efficiency = 78
Input/Output Queues Available = 8/8
Input/Output Bind seq nums = 126/126
Worker Assignments = 5
RCP GATE BYPASSED - FCTN INVOCATIONS RUNNING &
RCP GATE EFFICIENCY OR AVAILABLE QUEUES ARE LESS THAN 75%
---------------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 1

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 0 Self_Assignment = 1
---------------------------------------------------------------------------------------------------
```

Figure – 45 : Trace of the sample application

```
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 56
Input/Output Queues Available = 32/5
Input/Output Bind seq nums = 190/163
Worker Assignments = 9

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 1
Rcp Gate Efficiency = 82
Input/Output Queues Available = 26/26
Input/Output Bind seq nums = 158/158
Worker Assignments = 6

INVOCATION NUMBER = 1

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 8/8
Input/Output Bind seq nums = 134/134
Worker Assignments = 0
---------------------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1
---------------------------------------------------------------------------------------------
```

Figure – 46 : Trace of the sample application

```
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

Fctn invocations selected = 1
Fctn invocations running = 1
Rcp Gate Efficiency = 82
Input/Output Queues Available = 26/21
Input/Output Bind seq nums = 163/158
Worker Assignments = 6
RCP GATE BYPASSED - PREV FCTNS SELECTED, NOT YET DISPATCHED
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 83
Input/Output Queues Available = 8/8
Input/Output Bind seq nums = 134/134
Worker Assignments = 5

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
---------------------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
---------------------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 1 Self_Assignment = 1
---------------------------------------------------------------------------------------------
```

Figure – 47 : Trace of the sample application

```
-------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 59
Input/Output Queues Available = 32/26
Input/Output Bind seq nums = 195/189
Worker Assignments = 10

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH
-------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1  WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED
-------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2  WORKER_ID = 0

Fctn invocations selected = 1
Fctn invocations running = 0
Rcp Gate Efficiency = 98
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 158/158
Worker Assignments = 5
RCP GATE BYPASSED - PREV FCTNS SELECTED, NOT YET DISPATCHED
-------------------------------------------------------------------------------
EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3  WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 24/24
Input/Output Bind seq nums = 158/158
Worker Assignments = 0
-------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1
-------------------------------------------------------------------------------
WORKER ASSIGNED TO - Gate = 2, fctn = 6, Invoke_id = 0 Self_Assignment = 0
-------------------------------------------------------------------------------
```

Figure – 48 : Trace of the sample application